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# THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

EDITED BY WATSON DAVIS

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## RADIO NEWS OF THE WEEK

### RADIO AMATEURS TO AGAIN BRIDGE ATLANTIC

Hartford, Conn.

For the third time, American radio amateurs plan communication with continental stations using their own amateur sets. This year's trans-Atlantic tests will be conducted from December 12 to December 31 by the American Radio Relay League in cooperation with the amateur organizations in Canada, England, France and Holland.

In 1920 attempts at over-the-ocean telegraphing failed completely, but last year twenty-seven stations succeeded in making themselves heard at a special station in Scotland manned by Paul F. Godley, sent there by American amateurs for that purpose.

This year for the first time North American amateurs will listen for the signals of European non-commercial operators, F. H. Schnell, traffic manager of the A.R.R.L. announces. During the last ten days of the tests, both American and Canadian amateurs will be alert for messages from France and England. During the first ten days, Americans and Canadians will transmit signals for reception in England, France and Holland.

Preliminary tests will be held for the purpose of determining American and Canadian transmitters which will be given an individual schedule and secret code letters for transmission during the final tests. Qualifying transmitters must cover a distance of at least 1200 air line miles during the preliminary tests. A detailed sche-

dule for these elimination tests has been worked out for two and a half hours from 9:30 p.m. to midnight from October 25 to November 3. Special periods will be set aside during which amateurs in one inspection district will transmit while all others will listen in.

Station 8AP, Mr. Leon Deloy, President, Radio Club de la Cote D'Azur, 55 Blvd. Mont Boron, Nice, France, has been making tests for the last three months in an endeavor to reach the greatest efficiency for transmission in December. The British Post Office Department has given special permission to the Radio Society of Manchester, England, to use a power of 1000 watts for the express purpose of establishing amateur communication with the United States. This came as a result of the success of our trans-Atlantic tests last December, as heretofore, British amateurs were permitted to use a power not exceeding 10 watts and in very, very few cases 100 watts.

A special receiving station for copying signals from French and British amateurs will be erected somewhere along the Atlantic coast by Paul F. Godley who received the successful trans-Atlantics of last year.

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(A Chat on Science)

A Crazy Experiment and What Came of It

By Dr. Edwin E. Slosson

I suppose every scientific man occasionally tries experiments that he would not care to confess to his colleagues. Crazy ideas will pop up in the best regulated brains from some subconscious cellar and sometimes they are tried out, on Saturday afternoon when there is nobody else around, just to see what will come of them. They do not appear in the published reports, unless they happen to succeed, in which case the audacious experimenter will claim credit for foresight in undertaking an operation that ordinary minds would have condemned in advance as absurd.

Now it is interesting to observe that such erratic and irrational experimentation is distinctly recommended by the philosopher who laid down the laws of experimental science that have in the three centuries since accomplished such amazing achievements.

Lord Bacon, after listing in his precise and orderly manner all the various ways

that we may be guided in our researches by theory, observation and previous experiment concludes quite unexpectedly by adding a new category, what he calls the experiments of a madman and defines as follows:

"When you have a mind to try something not because reason or some other experiment leads you to it but simply because such a thing has never been attempted before."

"The leaving I say, of no stone in nature unturned, for the magnalia of nature generally lie out of the common roads and beaten paths so that they very absurdity of the thing may sometimes prove of service. But if reason go along with it, that is, if it be evident that an experiment of this nature has never been tried, then it is one of the best ways and plainly shakes the folds out of nature."

The example Bacon gives of such unprecedented experiments is of peculiar interest to us:

"But of what I may call close distillation no man has yet made trial. Yet it seems probable that the force of heat, if it can perform its exploits of alteration within the enclosure of the body, where there is neither loss of the body nor yet means of escape, will succeed at last in handcuffing this Proteus of matter and driving it to many transformations; only the heat must be so regulated and varied that there be no fracture of the vessels.

"No one should be disheartened or confounded if the experiments which he tries do not answer his expectation. For though a successful experiment be more agreeable, yet an unsuccessful one is often times no less instructive. And it must ever be kept in mind (as I am continually urging) that experiments of Light are even more to be sought after than experiments of Fruit."

What Bacon was "continually urging" that "experiments of Light" - those that lead to enlightenment on fundamental principles - "are even more to be sought after than experiments of Fruit" - those that bring practical results - needs more than ever to be kept in mind at the present day when public and employers are impatient of research that does not bring immediate and profitable returns.

So it is worthy of notice that the example that Bacon cites, as the experiment of a madman, that is, destructive distillation, has been peculiarly productive of both Light and Fruit. Applied to coal it has given us coke for metallurgy, gas for cities, and shops and coal tar products of innumerable variety and inestimable value. Applied to petroleum in the cracking process it has increased the yield of gasoline by some 2,000,000 gallons a day. By this "handcuffing this Proteus of matter and driving it to many transformations" Light has been thrown upon the structure of the molecule and the chemistry of life.

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USE SMALL SIZES  
OF ANTHRACITE COAL

Washington. If you change your anthracite order, at least part of it, to egg and pea, or egg and No. 1 buckwheat coal, you will get quicker delivery, as well as save money. This is advice given by fuel experts of the U. S. Navy.

These smaller sizes of anthracite are more available than the larger coal and they may be used to effect economy. The exact proportion of small and large coal should be determined by experience and by the weather conditions. In the ordinary furnace, however, there is not enough draft to produce satisfactory results when buckwheat is used with either chesnut or pea coal, but 25 per cent. No. 1 buckwheat can be used with 75 per cent. egg anthracite effectively.

In the morning, at least in mild weather, the furnace should be shaken down as usual and fired with regular coal. After the fire has begun burning well it can be checked or banked by using a quantity of the fine coal as a top dressing. At night, after the fire is shaken down and some of the larger coal put on, the fire can be banked for the night by shoveling on a top dressing of the buckwheat, the smallest size anthracite coal marketed. This top dressing tends to hold the draft and aids in the proper and economic combustion of the coal body as a whole.

Four-tenths pea coal can be used effectively with six-tenths egg. If you have a good bed of fire put the egg coal on first and then add a smaller amount of pea coal. If the fire is low, put on a little pea coal, and after a good bed of fire is formed, then add the egg and pea coal.

All pea coal can be burned in the heater and range but to do this a layer of ashes should be kept in the grate to prevent the coal from falling through. The grate should be shaken with short strokes - just enough to remove most of the ashes and yet leave a layer on the grate. The fire should be loosened up with a poker so that the air can pass through it and when it burns up brightly, a little coal should be added. When this has burned freely for about fifteen minutes, fill the fire box with coal almost to the bottom of the coaling door.

The different sizes of coal should not be mixed, but kept in separate bins.

**COKE RANKS MOST SCIENTIFIC FUEL**

Washington.

Coke is the best available substitute for anthracite, officials of the U. S. Bureau of Mines claim. It is the cleanest and most scientific of fuels. Unburned gasses, soot, and smoke which fly up the chimney in the soft coal fire have all been removed from the coke and converted to other uses. From one ton of bituminous coal coked in a by-product plant, 5,000 cubic feet of gas are made available for outside use. Besides this, ammonia, fuel oil, tar, and other products are also obtained from the coal by the coking process.

The smokelessness and decrease in the necessity of housecleaning more than offset the disadvantage of greater bulk, requiring more space in the cellar, and the difficulties of firing. Coke, however, gives little trouble to the person who knows how to use it.

In order to build a fire with coke from 10 to 15 pounds of kindling are required. When this is well ignited a six-inch layer of coke should be added and all the draft possible obtained. After this first layer is burning well, the furnace should be filled to the depth of from 14 to 18 inches and the draft checked to allow the fuel to burn more slowly.

Because the coke is more irregular in shape and has more angular edges it does not pack so closely as coal and there is more chance for a draft to get through. Therefore, in order to check the draft a greater thickness is needed in the fuel bed. This also gives a more uniform heat in the house, and produces less clinkers than a thin fire.

The less the coke is disturbed the better it does and it does not require near so much shaking down as coal. The best sizes of coke for furnace use are from  $1\frac{1}{2}$  to 2 inches. Two to four inch sizes do best in the open fireplaces. Here, too, is it should be remembered that a greater thickness of coke than coal bed is required.

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NEWS OF THE STARSBright Planets Approach Western Horizon

By Isabel M. Lewis  
of U.S. Naval Observatory

The four bright planets Venus and Mars, Jupiter and Saturn, that are now visible in the western sky immediately after sunset will gradually disappear from view one by one below the western horizon within the next few months.

Venus, the first to appear after sunset, because it is by far the most brilliant of all the planetary host, now shows the gibbous phase in the telescope. On the date of its greatest elongation east of the sun which occurs on September 15 this will change to the phase of the half moon. From that time on it will be in the crescent phase and will gradually draw in toward the sun and increase in brightness until it attains its greatest brilliancy on October 21 when it will be halfway between eastern elongation and inferior conjunction with the sun. Shortly before its date of inferior conjunction with the sun on November 25, Venus will disappear from view in the western sky to reappear soon after conjunction as a morning star in the east.

Saturn is now the nearest of the four planets to the horizon at sunset and can be seen for only a brief period in the evening twilight. It will be in conjunction with the sun and will disappear from the western sky on October 4.

Jupiter is still a conspicuous object near the western horizon for a short time after sunset but it is far inferior to Venus in brightness and is at the additional disadvantage of being so close to the horizon that its light is dimmed by atmospheric haze. It passes from east to west of the sun on the date of its conjunction with the sun October 23 and for some days before and after that date it will be too close to the sun to be seen in the evening or morning twilight.

Mars is now near the meridian at sunset and will be the last of the four planets to disappear from view. It will be visible in the evening hours throughout the fall months but is rapidly decreasing in brightness as its distance from the earth increases.

Its distance from the earth on October 1 will be about eighty-four million miles and by the middle of October it will be as far from the earth as the earth is from the sun. Its surface markings can no longer be studied to advantage and so the ruddy planet will not be an object of special interest until near the date of its next opposition in August, 1924, when it will be less than thirty-five million miles from the earth and at its nearest possible approach to our own planet.

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LESS THAN DROP  
WOULD DEPOPULATE WORLD

Cambridge, Mass. Poison so powerful that all the people on earth could be killed by one millionth of half an ordinary thimble full! Drs. Jaques Bronfenbrenner and M. J. Schlesinger of Harvard University have found that the strength of the botulinus toxin, which occurs in spoiled vegetable food, is so great that the average man would die from a dose of 0.0000000000000001 cubic centimeters of it.

As there are 473 cubic centimeters in a pint, only an infinitesimal amount would be required to swamp the immigration authorities in Heaven. One cubic centimeter would be enough to depopulate the whole earth with 999,999 parts left over.

Botulinus poisoning was first known as "sausage" poisoning and was detected after fatalities resulting from eating sausage, meats and fish. Recently, this poisoning has been more common after the eating of decayed vegetable foods. It is caused by the germ *Bacillus botulinus* and, unlike the toxin of diphtheria or lockjaw, it is deadly poisonous when introduced into the body by way of the mouth.

Contamination of foodstuff producing this poison is not common and should such poisoning be present it is usually readily detected by the putrid odor of the food. If the poisoned food is boiled, it ceases to be harmful, while even when the poison is actually consumed, nature and an antitoxin may protect the individual.

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## WASHING PHOTO PLATES INCREASES SENSITIVENESS

Washington. - Washing commercial panchromatic photographic plates in ordinary tap water for five minutes before use makes them more sensitive to color, Francis M. Walters, Jr. and Raymond Davis of the U. S. Bureau of Standards have discovered.

Ordinary photographic plates record as white the dark blue and violet light and even the ultra-violet light that can not be seen by the human eye, while the green, yellow, orange and red lights to which the eye is sensitive are portrayed as black.

During the past few years it has been found that by the addition of small amounts of certain dyes, the photographic plate may, however, be made sensitive to green, yellow, orange and red. Plates which are sensitive to the yellow-green as well as to the blue-and-violet, are usually called orthochromatic, while plates which are sensitive also to the orange and red are called panchromatic or spectrum plates.

The work of the two Bureau of Standards photographic experts will allow better results in photographic portrayal of color. The increased sensitivity results from the removal by the water of certain restraining substances from the emulsion, they believe. These are probably formed during the time that the plates are travelling from factory to user.

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## BRANDS TIRED METALS AS PROGRESSIVE FAILURES

Washington. Failures of metals under often repeated stresses which have been referred to as the "fatigue of metals" are more accurately described as progressive failures, according to a report of experiments conducted by the National Research Council's Division of Engineering. "Fatigue, or progressive failures, spread from particle to particle, in contrast with failures under steady loads, which develop the average strength of a considerable body of metal. A single minute imperfection may prove fatal to the piece subjected to repeated stresses.

"The most probable explanation of this failure seems to be that such failure is a progressive spread of microscopic fractures. The damage may start with a groove, a scratch or a crack."

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MYSTERIOUS FORCES ATTACK  
COMETS IN SOLAR SYSTEM

Williams Bay, Wis.

Long and delicate comet tails sweeping through the planetary spaces are sometimes disturbed and broken by some force still mysterious to astronomers, Prof. E. E. Barnard of Yerkes Observatory revealed here at the meeting of the American Astronomical Society.

Besides showing that the comet itself has much control over the direction of the tail and streamers, photography, that reveals what the eye can not see, has shown that unknown influences opposed to the theory of gravitation seem to be at work in the space immediately about our sun.

"This is highly suggestive and may lead to discoveries of very great importance concerning certain conditions within the solar system," declares Prof. Barnard.

"It is well known that a comet's tail always points approximately away from the sun," explains Prof. Barnard, and that its form is determined by the speed with which the small particles forming it leave the head, going outward from the sun by the pressure of the sun's light. We may therefore have, if the particles are moving very fast, relative to the speed of the comet in its orbit, a very straight tail pointing directly away from the sun. If the speed of the particles is relatively slow, then the motion of the comet in its orbit, combined with the motion of the particles, will cause the tail to be curved away from the direction of motion. These features of a comet's tail are easily understood from our knowledge of the motion of a comet and the repellent action of the sun's light, so that we may have a straight tail if the particles are moving very fast away from the sun or a violently curved one if their motion is slow. But the curvature, if there is any, must

invariably be away from the direction of motion. Photographs have sometimes shown a curvature in a contrary direction to this and that the tail has been thrown forward at a large angle, sometimes suddenly, thus moving faster than the comet itself which is nearer the sun. This is opposed to the theory of gravitation and must be due to some cause which is independent of the sun and comet. Within twenty-four hours it may recover its natural position."

Prof. Barnard explains that by far the most interesting comets have not been visible to the naked eye. The smaller and more active comets are studied on the photographic plate. Some of the very large and best known comets, as Halley's comet of 1910 and others have not shown any unusual phenomena.

"Sometimes a comet will reject its tail, always sending out a new one in a slightly different direction, which, like the smoke from a locomotive, will drift away and dissipate in space," he says. "Sometimes a comet will cease to hold its particles together and will itself melt away in space and cease forever to be a comet. These are called 'lost comets'. Beilla's is the best known of the lost comets. It has resolved itself into a great swarm of meteors that sometimes are encountered by the earth and burned up in our atmosphere. These displays are called meteoric showers. A comet may sometimes separate into two or more bodies and later disappear altogether from the heavens."

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#### TELLS HOW EARTH LOOKS FROM MOON

Yerkes Observatory, Williams Bay, Wis. Sept. 7.- The man in the moon could never get very thoroughly lit up by what the earth furnishes him. Explaining a new method of measuring the "earthlight" on the moon and the brightness of the dark parts of fair Luna, Professor Edward S. King of the Harvard Observatory told the American Astronomical Society that the brilliancy of our satellite is about 10,000 times greater

than the light delivered on its surface by this dull terrestrial sphere.

"When the moon shows a thin crescent the dark portion may be clearly seen standing out against the sky. This appearance is popularly called the 'old moon in the new moon's arms' and this dark portion," said Dr. King, "is illuminated by light reflected by the earth or 'earthlight.' Earthlight on the moon is analogous to moonlight on the earth.

"My preliminary measures indicate that if the whole disk of the moon were lighted solely from the earth the total photographic brightness would be about minus 2.0 magnitudes or, in other words, if the light were concentrated to a point, it would have nearly twice the luminosity of the Dog Star, which is the brightest star in the sky. The brilliancy of the full moon is about 10,000 times greater. The brightness is measured by comparing images of the moon photographed in focus with images of stars photographed out of focus, and by this method all portions of the lunar surface at the different phases can be measured."

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#### SCIENTISTS MEET AT RUINS OF OLDEST WALLED CITY

Santa Fe, N.M. September 7.- Within the ruins of the oldest walled city in the United States, a field session of the Southwestern Division of the American Association for the Advancement of Science was held this afternoon. The site is that of the Pueblo of Pecos which, if archaeological research workers are correct in their estimates, was a flourishing community even as long ago as 600 A.D.

Dr. A. V. Kidder who has been in charge of excavations for Andover College for four years told of his investigations on this site, now owned by the School of American Research at Santa Fe. He has disclosed much of the life and culture of the inhabitants of Pecos from the earliest times until 1837, when the pueblo was evacuated by its inhabitants, who went over to the pueblo of Jemez, 75 miles farther west, where their descendants are still an important portion of the community life. A community independent and democratic in government, considerably advanced in culture,

practising a beautiful religion, and living an admirable philosophy, was pictured by Dr. Kidder.

The walls of the ancient city are still standing in part. The excavation of one of the great community houses has disclosed walls two and three stories high. Trenches across the patio of the older community house have laid bare one of the early underground sanctuaries and from it was taken much interesting material, to which Dr. Kidder and his expedition have added year after year. When first visited by the Spaniards in 1540, eighty years before the Pilgrims landed at Plymouth Rock, Pecos probably had 2500 inhabitants, although the early chroniclers in their reports magnified its size ten-fold. Nevertheless, their description of the community house and its life was fairly accurate, as is proven by Dr. Kidder's excavations. The material taken out is being placed in the Peabody Museum at Andover, Mass., except that portions of it will be kept in the Museum of New Mexico at Santa Fe.

Colonel Ralph E. Twitchell, the New Mexican historian, told of the Santa Fe Trail, the centenary of which was celebrated by the Santa Fe Fiesta, which closed the day before.

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HONOR NEW MEXICAN  
SCIENTIST-PHILANTHROPIST

Santa Fe, N.M. September 8.- The unveiling tonight of a bronze bust of Frank Springer, paleontologist, lawyer, banker, and philanthropist, at the meeting of the Southwestern Division of the American Association for the Advancement of Science was an unusual honor to be bestowed on a scientist. The beautiful bronze is the work of the Italian sculptor, Scarpitta, and was presented to the State of New Mexico to be permanently placed in the art galleries of the Museum of New Mexico, which owes its inception to the generosity of Mr. Springer and his friends. It is now maintained by the State of New Mexico and is the only state which maintains an art gallery with public money.

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FIND MURAL PAINTINGS  
IN INDIAN CAVES

Santa Fe, N.M. Sept. 9.- Striking mural decorations in color that rival the famous paintings on the walls of the Cro-Magnon caves of southwestern Europe have been discovered in the caves of the volcanic Pajarito Plateau near here by Kenneth M. Chapman of the School of American Research.

Some of these prehistoric paintings are purely geometric and symbolic in design while others are pictures of the hunt and battle. They were explained to a field meeting of the Southwestern Division of the American Association for the Advancement of Science held this afternoon in a deep cleft of Bandelier National Monument, 35 miles from here.

The cleft was that of the Rito de los Frijoles, at the bottom of which are located the ruins of a great community house dating back to prehistoric times and more than a dozen talus villages as well as hundreds of prehistoric cave dwellings. The community house and the talus villages have been excavated by the School of American Research, and one of the talus villages, that of the Sun Clan, has been restored.

Tyuonyi, the elliptical community house, which in ancient times was three stories high, and in whose patio were three large kivas, was viewed by the visiting scientists under the guidance of Dr. Edgar L. Hewett, who was in charge of the excavations almost two decades ago. He drew a vivid picture of the culture of the people who once inhabited this picturesque canyon. From the community house a walking trip was made to the huge ceremonial cave, reached by steps hewn in the volcanic tufa and ladders. At the kiva, the subterranean sanctuary overshadowed by the roof of the cave, a part of the session was held as the cave was large enough for the gathering. It overlooked the treetops of the beautiful canyon, watered by a perennial stream of crystal clear water.

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No. 76

DO YOU KNOW THAT -

The prehistoric horned dinosaurs were fighters and often engaged in combat. Healed wounds, broken horns, and fractured and healed jaws are found in many skulls.

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Small factories can produce a clear sirup of excellent flavor from sweet potatoes

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Eleven per cent. of the total foreign born white population of this country are unable to speak English. Ten years ago 22.8 per cent. were unable to speak English.

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Two pounds of dry wood of any non-resinous species have about as much heating value as a pound of good coal.

DO YOU KNOW THAT -

An improvement in the sugar beet resulted from Napoleon's offer of a million francs, made in 1806 for the satisfactory production of sugar from home-grown plants.

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The Carolina rail or sora has small short wings, flies reluctantly and with great awkwardness, yet in its migration this bird easily crosses the wide reaches of the Caribbean Sea.

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A minute drop of acid secretion from the bee causes the chemical change which converts into honey the sweet water obtained from flowers.

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The brighter the lightning the more blue it appears, while distant lightning appears red for the same reason that the sun and moon appear red near the horizon.

DO YOU KNOW THAT -

Many a bobwhite rounds out its full period of existence without ever going ten miles from the nest where it was hatched.

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A mass of earth taken from the Kimberley mines each year would cover a city block to a height of thirty stories, but the diamonds obtained would only fill two or three desk drawers.

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The manufacture of airplanes is being undertaken in Australia.

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Grated pineapple is made from the portion pared off, a choice part formerly wasted.

DO YOU KNOW THAT -

The arctic tern is the world's champion daylight saver. This bird has 24 hours of daylight eight months in the year and considerably more daylight than darkness the other 4 months.

Paper enough for the whole world could be made from the bamboo and Savannah grasses of India much cheaper than paper can be made from wood pulp, chemists claim.

It is estimated that the demand for petroleum is increasing in this country at the rate of about 50,000,000 barrels a year.

Airplane service is being organized to connect the French ports of Havre and Cherbourg with a fast train leaving Southampton, England, for London, for the convenience of trans-Atlantic passengers desiring to visit the British capital.

DO YOU KNOW THAT -

Magnesium, the metal formerly used in photographic flash-light powders, is now being used as the major constituent of an alloy in high speed motors and racing cars.

The first practical military smokeless powder appears to have been developed by Vieille in France in 1886.

It is estimated that last year the people of this country consumed 12.3 pounds of coffee per capita.

The energy value of the avocado or alligator pear is more than twice that of most other fruits.

DO YOU KNOW THAT -

Should nature, by the process of the coal age, transform the densest jungle in the world today into a coal seam it probably would be only a few inches thick.

Pliny says that the Romans, more than two thousand years ago, imported Roquefort cheese from France to add flavor to their banquets.

A rush order of automobile accessories were recently sent from Dayton, Ohio, to Canada by airplane.

Deep sea fishes found in the stomach of the swordfish seem to indicate that the swordfish descends to considerable depths for its meals.

READING REFERENCES TO SCIENCE NEWS LETTER

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FRAGMENTS OF SCIENCE

I doubt whether happiness is possible without a sense of accomplishment, either individually or socially.- Dr. John C. Merriam, president of Carnegie Institution of Washington.

At the time that the giant dinosaurs flourished a warm climate extended over all the temperate and even Arctic regions, if we may judge from the tropical flora associated with them. It was also a time when vast swamps and deltas and heavily forested lowlands stretched over a great part of the land areas, in contrast to the great plateaus, mountain ranges, and arid or desert interiors that characterize our modern continents.- W. D. Matthew, curator-in-chief, Division of Mineralogy and Geology, American Museum.

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